Diesel or slow-combustion oil engine, as the authors term it.

The authors, in addition to much original matter, have brought together into convenient form for reference the results of experimental work and the information in regard to constructive details published in the columns of the technical Press of the past ten years, or embodied in the numerous papers read before the leading engineering societies of the world; for this reason alone the book will prove invaluable both to the many engineering firms which now build these engines, and to the engineers who have installed them in power stations, factories, and ships.

The first four chapters deal with the theory of the laws of perfect gases, the work which can be obtained from a given volume of gas when expanding under given conditions, and the application of the well-known entropy diagrams to the study of the internal combustion engine. The next chapter deals with oil fuels suitable for these engines, their physical properties and methods of transport, and storage; in this connection the authors refer to the vast shale deposits in Australia, and to their utilisation for the production of oils for power purposes in that continent. In connection with the question of the cost of power generated by Diesel engines, it may be mentioned that in a test of a 200 b.h.p. two-cylinder four-stroke cycle engine, Mr. Eberle obtained under full load a thermal efficiency of 34·2 per cent. reckoned on the b.h.p., a wonderfully good result. In connection with the testing of Diesel engines the authors give some useful advice as to the care and attention necessary in order to maintain a high state of efficiency.

In view of the importance to designers of Diesel engines of a thorough knowledge of the theory and practice of air compression, the authors have wisely devoted a whole chapter to this subject, and have done their work admirably. The ninth chapter deals with the data and calculations needed in the design of cylinders, crankshafts, valves, flywheels, and reversing gears, while the concluding chapter is devoted to an account, well illustrated, of a number of recently-constructed Diesel engines for all classes of land and marine work; it is in connection with marine work that the greatest advance has taken place in the last two or three years. In an appendix the authors give a most useful abridgment of the principal patents connected with this remarkable motor and its developments.

(4) In this volume, which forms one of a series of text-books on the chemistry of the national industries, Mr. Searle deals with the three important building materials—cements, concrete, and bricks. The importance of a knowledge of chemistry in the manufacture of cement has been long recognised, and to this fact is due the great advance this industry has made during the past twenty years, but it is only recently that the value of chemical research to the brickmaker has been fully realised. In the first five chapters the author deals with cement, most attention being given naturally to Portland cement; he discusses fully the necessary properties of the raw materials, and the various methods of manufacture; Mr. Searle is of opinion that with equal care and skill both the older wet process and the modern dry process produce good results. The chemical and physical changes which occur both in the manufacture and in the setting of cements are most fully and thoroughly discussed, especially the chemical relations between the lime, alumina, and silica. In chapter v. the question of the testing of cement is taken up, the various methods adopted are fully explained, and the importance of cement-sand tests is clearly brought out, the author expressing his opinion that tensile tests of neat cement are largely futile; in dealing with the tests for soundness it is shown that this is a test which it is difficult to carry out with accuracy, and that, as a matter of fact, the majority of the Portland cements now on the market will pass all the ordinary tests for soundness.

Two chapters are devoted to the components of concrete and its preparation, and much excellent practical advice is given; then follows a chapter on reinforced concrete; the author points out that many of the formulæ now used in calculation work contain constants, which in the hands of the experienced man are safely used, but when used by a beginner may lead to serious blunders. The remainder of the book is devoted to brickmaking; the chemical and physical properties of the raw materials are fully discussed, the various processes of manufacture described, and the properties of finished bricks of various classes explained. Mr. Searle has written a thoroughly sound, valuable text-book, which ought to prove of great service to manufacturers, builders, and architects.

T. H. B.

OUR BOOKSHELF.

Lehrbuch der Paläozoologie. Teil ii., Wirbeltiere. By Dr. E. F. Stromer v. Reichenbach. Pp. ix + 325. (Leipzig and Berlin: B. G. Teubner, 1912.) Price 10 marks.

THE second part of Dr. Stromer's text-book of palæozoology deals with the fossil vertebrates in the same concise and philosophical manner as his previous account of the invertebrates. The

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descriptive sections comprise only just such conspicuous families and genera as are needed by a student who seeks a broad view of the subject; and at the end of the chapter on each class there is a brief summary of the leading features in the geological distribution and evolution of the class as a whole, with a table of diagnoses of its larger subdivisions. A useful list of the principal papers and books published during the last few years is also appended. The text throughout is well illustrated with drawings of more than usual artistic merit, and although the majority of them are taken, with acknowledgment, from various original works, Dr. Stromer himself has frequently amended them to bring them up-to-date. Some, indeed, are in advance of their formal publication, such as the drawing of the skeleton of the strange clawed ungulate mammal Moropus, contributed by Dr. W. J. Holland. So many are new to a text-book that their appearance is quite refreshing.

In a work designed for elementary teaching it is generally advisable to incline towards conservatism, and Dr. Stromer evidently holds this opinion. Among fishes, for instance, he still recognises the "orders" Ganoidei and Teleostei, though his so-called diagnoses do not define them; and his treatment of the early palæozoic Arthrodira and Ostracodermi is not altogether satisfactory from the modern point of view. His references to the literature, however, will enable the student to examine other views if he wishes to do so.

The last sixty pages of the book are devoted to the general principles of palæontology, and we can recommend this able summary to any zoologist who desires to understand the present position of those who study fossils. A. S. W.

A Treatise on Wooden Trestle Bridges and their Concrete Substitutes. By Wolcott C. Foster. Fourth revised and enlarged edition. Pp. xix + 440. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1913.) Price 21*s*. net.

IN the present edition of this work, which was first published in 1891, will be found a very full account of the construction, erection, maintenance, and preservation of timber trestle bridges. The book is profusely illustrated, and contains working drawings showing the details of the standard trestles used on the principal American railroads. Wooden trestles may be disappearing gradually from main lines of heavy traffic, but the increased growth of branch lines, or feeders, and of trestles at manufacturing plants and for electric railways, have probably more than kept pace with its abandonment on main lines. There is, on the average, about 100 ft. of bridges and trestles to each mile of railroad in the United States. The wearing out of wooden trestles and the increasing cost and scarcity of timber suitable for their replacement has taxed the ingenuity of railroad officials to find suitable structures to take their place. In some cases iron or steel structures have been employed, but there are numerous districts where local conditions make these methods so expensive as to be prohibitive.

In the past few years a number of roads have used concrete trestles in replacing those constructed of timber, and the author gives full particulars of reinforced concrete trestles and slabs which form a structure closely in line with the main features of the timber trestle. The book provides a great deal of valuable information regarding the strength, durability, and preservation of timber under all kinds of practical conditions, and therefore will be of service to British engineers, despite the fact that timber bridges do not occur often on British railways.

Durch König Tschulalongkorns Reich. Eine deutsche Siam-Expedition. By Dr. Carl C. Hosseus. Pp. xii + 219 + plates. (Stuttgart: Stecker and Schroder, n.d.) Price 15 marks.

DR. C. C. HOSSEUS, who visited Siam in 1904–06, gives us in the present volume an account of his journey and scientific observations. The route lay up the Mäping, and at various halting-places excursions were made to the neighbouring country. Chiengmai appears to have been his chief base, and from there Doi Intanon, Chieng Dao, Pahombuk, and Chiengrai, to mention only a few of the more important, were visited.

Zoologists, geologists, ethnologists, geographers, and other naturalists will all find much to interest them in the book; for quite a casual glance through its pages will suffice to show that the author was ever on the alert to note points of interest in any branch of science. But it is undoubtedly to the botanist that the author has in the first place appealed.

Previous to this work the author had published lists of his botanical collections, so that here we have no complete catalogue, but references are given to the new species found and to many others interesting for some morphological detail or for their associations. Here it may be noted that the index, copious though it may appear, is not a complete index to all the plants mentioned.

A word of praise is due for the numerous excellent illustrations included at the end of the book. All who are interested in Asiatic botany must feel indebted to Dr. Hosseus, to whom must be attributed the credit of being the first scientific traveller and collector on a large scale north of Bangkok, for supplementing his previous lists with such an interesting book.

Biology: General and Medical. By Prof. Joseph McFarland. Pp. 457, with 160 illustrations. Second edition. (Philadelphia and London: W. B. Saunders Co., 1913.) Price 7*s*. 6*d*. net.

THE first edition of Prof. McFarland's book appeared in 1910, and was reviewed at length in the issue of NATURE for March 23, 1911 (vol. lxxxvi., p. 106). In the present edition the author has endeavoured to eliminate defects discovered in the book, and without much increasing its size to introduce the new matter necessary to bring it up to date.

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